resistance field-effect element according to the present invention.

Figure 3 is a static characteristic plot of drain-source voltage versus drain current obtained at 40 K in an example of the negative resistance field-effect element according to the present invention.

5   Figures 4(A), (B) and (C) are explanatory diagrams of an example of a trench shape for forming quantum wires that is advantageous for use in fabricating a negative resistance field-effect element according to the present invention.

10   Best Mode for Carrying out the Invention

A preferred embodiment of a negative resistance field-effect element 10 configured according to the present invention is shown in Figures 1(A) and (B). As viewed statically from the sectional structure shown in the left-side diagram of Figure 1(A), an InAlAs or AlGaAs barrier layer, in this

15   case an InAlAs barrier layer 12, is formed on an InP or GaAs substrate, in the illustrated case an InP substrate 11, having an asymmetrical V-groove, thereby forming a trench TR that is a deep V-groove having very steep lateral faces at the location of the InAlAs barrier layer 12 where the V-groove is present in the underlying InP substrate 11. The distance between the

20   inclined surfaces near the bottom portion of the trench TR (space width) can, as explained later, be formed very narrowly.

Details of the sectional lamination at the essential portion enclosed by the phantom line in the left-side diagram are shown in the right-side diagram of Figure 1(A). Referring to this, first an InGaAs or GaAs quantum

25   wire, in this case an InGaAs quantum wire 13, having a relatively narrow energy band gap is formed on the bottom surface of the trench TR of the InAlAs barrier layer 12 as a high-mobility channel, and an InAlAs or AlGaAs